REMARKS

In the last Office Action, claims 1-4 and 6-8 were rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 4,653,991 to Takao et al. ("Takao") in view of Publication No. JP60-145476 to Matsushita (referred to by the Examiner as Matsuda et al.). Claim 5 was objected to as being dependent upon a rejected base claim and was otherwise indicated to be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Applicants acknowledge with appreciation the indication of allowability concerning claim 5. However, for the reasons discussed below, applicants respectfully submit that rejected claims 1-4 and 6-8 also patentably distinguish over the prior art.

The present invention pertains to a gas compressor of the vane type in which vanes are slidably disposed in vane grooves formed in a rotor which undergoes rotation in a cylinder. During rotation of the rotor, the vanes project outwardly from the vane grooves and make sliding contact with the inner surface of the cylinder to form compression chambers in which refrigerant mixed with lubricating oil is drawn in by suction, compressed and discharged.

In accordance with the present invention, the vane type compressor comprises, with reference to the illustrative embodiments shown in the drawings, a rotor 11 rotatably disposed in a cylinder 5 and carrying a plurality of vanes 15 slidable in vane grooves 12 formed in the rotor 11. A back pressure space 14 is formed at the bottom portions of the vane grooves 12. A first high pressure oil passage 31 establishes communication between an oil sump of the compressor and the vane groove bottom portions at the back pressure space 14. A second high pressure oil passage 32 establishes communication between the oil sump and the back pressure space 14. An opening/closing valve, which in the disclosed embodiments comprises a spool valve element 35, is provided for opening and closing the second high pressure oil passage 32. The second high pressure oil passage 32 communicates with high pressure oil supplying support holes 33 which, as shown in Fig. 2, are positioned to communicate with the back pressure space at the bottom portions of the vane grooves during rotation of the rotor 11.

As shown, for example, in Fig. 4, the opening/closing valve opens the second high pressure oil passage 32 when the valve spool element 35 is in the rightward position and closes the passage 32 when the valve spool element is the leftward position. During start-up and low

speed operation, the pressure of the high pressure oil is approximately the same as that of the low pressure oil and the differential pressure across the spool valve element 35 is small so that the spring 37 urges the valve spool element to its rightward position thereby opening the second high pressure oil passage 32 whereby high pressure oil is supplied to the high pressure oil supplying support hole 33 and into the back pressure space 14 to increase the extruding force of the vanes 15. On the other hand, during normal operation, the pressure of the high pressure oil is sufficiently greater than that of the low pressure oil whereupon the valve spool element 35 is moved leftwardly to its leftward position to close the second high pressure oil passage 32 thereby discontinuing the flow of high pressure oil through the high pressure oil supplying support hole 33 to the back pressure space 14.

Independent claim 1 recites a gas compressor having a compressor main body having a cylinder, side blocks disposed at axial ends of the cylinder, a rotor rotatable in the cylinder, vane grooves extending inwardly from an outer peripheral surface of the rotor toward an inner periphery thereof, and vanes slidable in the vane grooves for slidably advancing and retracting during rotation of the rotor; a back pressure space including bottom portions of the vane grooves and attaining a middle pressure between a suction pressure and

a discharge pressure during normal operation of the compressor main body; a first high pressure oil passage establishing communication between an oil sump and the vane groove bottom portions when the vanes are at their discharge stroke positions; a second high pressure oil passage establishing communication between the oil sump and the back pressure space; and an opening/closing valve for opening and closing the second high pressure oil passage. No similar gas compressor is disclosed or suggested by the prior art.

The primary reference to Takao discloses a vane type gas compressor having a compressor main body; a back pressure space including bottom portions of the vane grooves 27 and attaining a middle pressure between a suction pressure and a discharge pressure during normal operation of the compressor main body; a first high pressure oil passage 31 establishing communication between the oil sump and the vane groove bottom portions when the vanes are at their discharge stroke positions; and a second low (not high) pressure oil passage 33 establishing communication between the oil sump and the back pressure space (Fig. 3). As recognized by the Examiner, Takao does not discloses an opening/closing valve for opening and closing the second oil passage 33.

In the statement of rejection, the Examiner contends that Takao discloses a second high pressure oil passage 33

establishing communication between the oil sump and the back pressure space. This in incorrect. The oil passage 33 of Takao is a low pressure -- not high pressure -- oil passage as clearly stated at column 4, lines 28-30 and described more fully by column 4, line 46 - column 5, line 18. As described by Takao, the low pressure port 33 (as well as the low pressure port 32) is fan-shaped and communicates with the back pressure space throughout the suction/compression cycle, as shown in Fig. 3. The fan-shaped ports 33 are similar to, and function the same as, the flat groove portions 17 shown in Fig. 2 of the application drawings. In this regard, Fig. 3 of Takao is equivalent to the prior art shown in Figs. 11-12 of the present application. It is irrefutable that the oil passage 33 of Takao is a low pressure oil passage -- not a high pressure oil passage as stated in the rejection. Therefore Takao does not disclose a second high pressure oil passage establishing communication between the oil sump and the back pressure space, nor does Takao disclose an opening/closing valve for opening and closing the second high pressure oil passage, as explicitly required by independent claim 1.

The secondary reference to Matsushita likewise fails to disclose a second high pressure oil passage establishing communication between an oil sump and a back pressure space,

and an opening/closing valve for opening and closing the second high pressure oil passage. Matsushita discloses an oil feeding apparatus for a vane type compressor in which an oil feeding passage 16 supplies either high pressure oil to a high pressure passage 23 or low pressure oil to a low pressure passage 22 depending on the position of a spool valve element 21. As shown in the drawing, the spool valve element 21 is biased leftwardly by a spring and when in the leftward position, the spool valve element 21 closes the low pressure passage 22 and opens the high pressure passage 23 so that oil from the oil feeding passage 16 flows through an annular passage 28 of the spool valve element into the high pressure passage 23. On the other hand, when the spool valve element 21 moves rightwardly to its rightward position, the spool valve element closes the high pressure passage 23 and opens the low pressure passage 22 so that oil from the oil passage 16 flows through a passage 29 into the low pressure passage 22.

According to Matsushita, the high pressure passage 23 has a larger flow-passage area than that of the low pressure passage 22. In both cases, however, the spool valve element 21 opens one or the other of the passages 22 and 23 so that less or more oil flows through the outlet of the oil feeding passage 16. On the other hand, claim 1 requires an

opening/closing valve for opening and closing the second high pressure oil passage. In Matsushita the outlet of the oil feeding passage 16 is always open. Therefore even if Takao were modified in view of Matsushita, it is not understood how the modified gas compressor would resemble that required by independent claim 1. In addition, it is not understood in what manner the Takao gas compressor could be modified in view of Matsushita to arrive at the claimed invention. For example, it is not understood where the oil feeding apparatus of Matsushita would be incorporated in the Takao gas compressor, or how any such modification would enable the Takao gas compressor to function and operate in its intended manner. In the event the Examiner repeats this ground of rejection, applicants respectfully request that the Examiner point out the manner by which the Takao gas compressor could be modified in view of Matsushita to meet the terms of claim 1.

In rejecting claim 1, the Examiner stated that the limitation of an opening/closing valve "for opening and closing the second high pressure oil passage" is a statement of intended use which cannot be relied upon to patentably distinguish the claim from the prior art, citing In re Otto and In re Casey. Applicants respectfully submit that the Otto and Casey cases are not applicable to the recitation at issue in claim 1.

In Casey, the Court held that the patentability of an apparatus cannot be predicated on the description of the apparatus given in the preamble, i.e., the intended use of the apparatus as described in the preamble. Such is not the case here, and applicants are not relying upon the preamble for patentability but rather are relying, in part, on the provision of an opening/closing valve for opening and closing the second high pressure oil passage, a limitation which is lacking in the prior art.

In Otto, the claim at issue involved an article of manufacture used for curling hair, and patentability of the article of manufacture was predicated upon a certain procedure for curling hair using the article. The Court affirmed the rejection, noting that the prior art disclosed all of the claim limitations and that patentability was being predicated on elements not recited in the claim. Again, no such situation exists here, and applicants are asserting patentability based on limitations explicitly recited in claim 1.

The same rationale applies for the recitation in claim 7 that the Examiner contends is a statement of intended use.

Applicants respectfully submit that the Examiner must give all functional language set forth in the claims full

patentable weight. As stated by the Board of Appeals and Interferences in Ex parte Bylund, 217 USPQ 492, 498 (BPAI 1981):

> ... Although we have sustained several of the Examiner's rejections we here wish to specifically note that contrary to the Examiner's assertions, functional language in the claims must be given full weight and may not be disregarded in evaluating the patentability of the subject matter defined employing such functional language. However, the applicant must establish that what is taught by the reference does not inherently function in the manner required by the claim.

Here, independent claim 1 explicitly recites the limitation of "an opening/closing valve for opening and closing the second high pressure oil passage." The Examiner cannot disregard this functional language in evaluating the patentability of claim 1 and, when due consideration is given to this limitation, it is clear that the combined teachings of Takao and Matsushita do not disclose, suggest or render obvious the claimed invention.

In view of the foregoing, applicants respectfully submit that claims 1-8 clearly patentably distinguish over the combined teachings of the prior art. Accordingly, favorable reconsideration and passage of the application to issue are respectfully requested.

Respectfully submitted,

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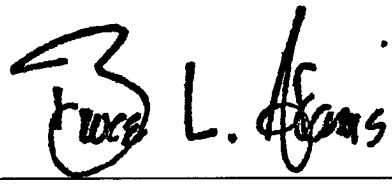
By: 
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